

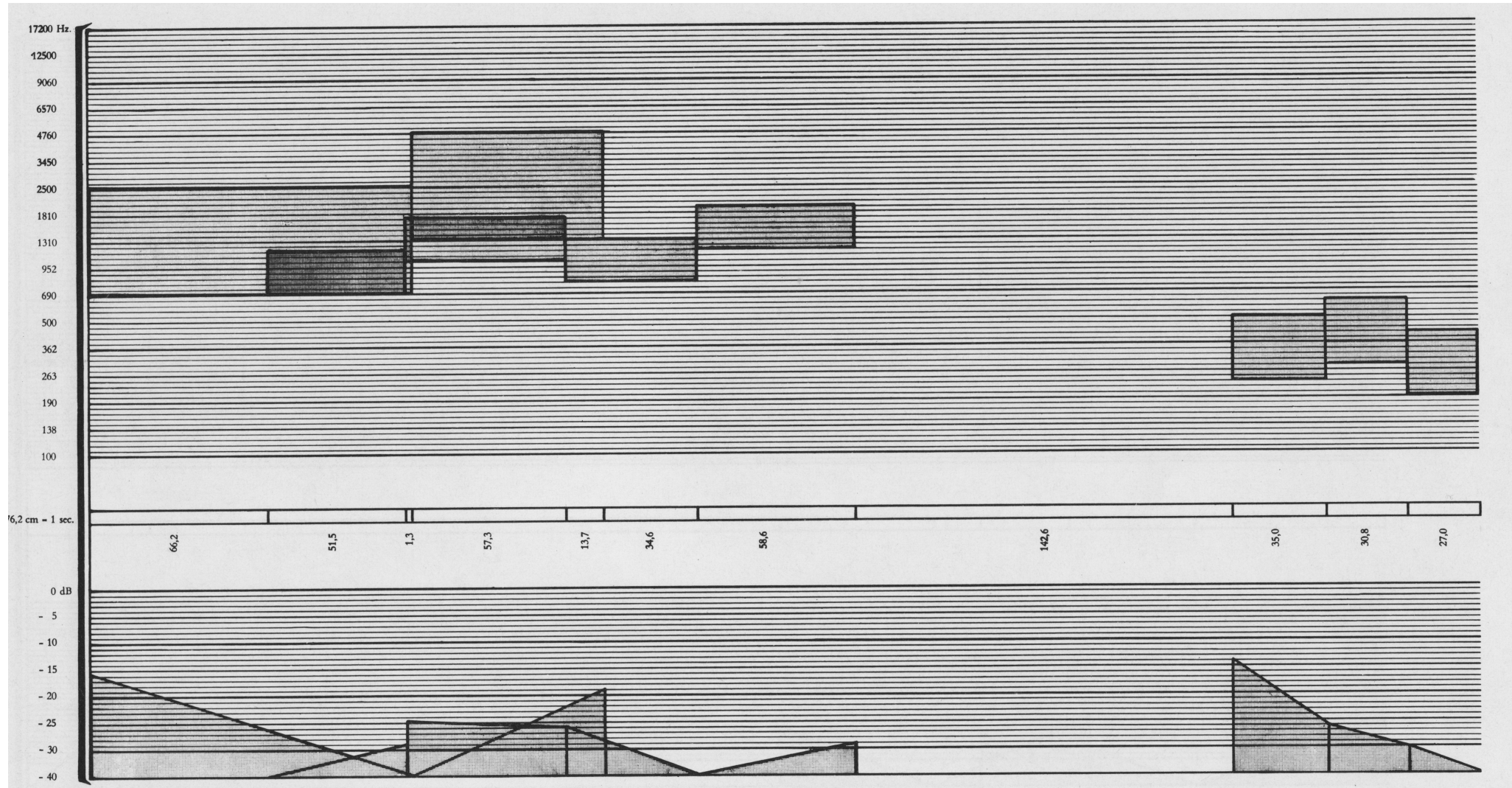


Joachim Heintz

Re-Generating Stockhausen's *Studie II* in Csound

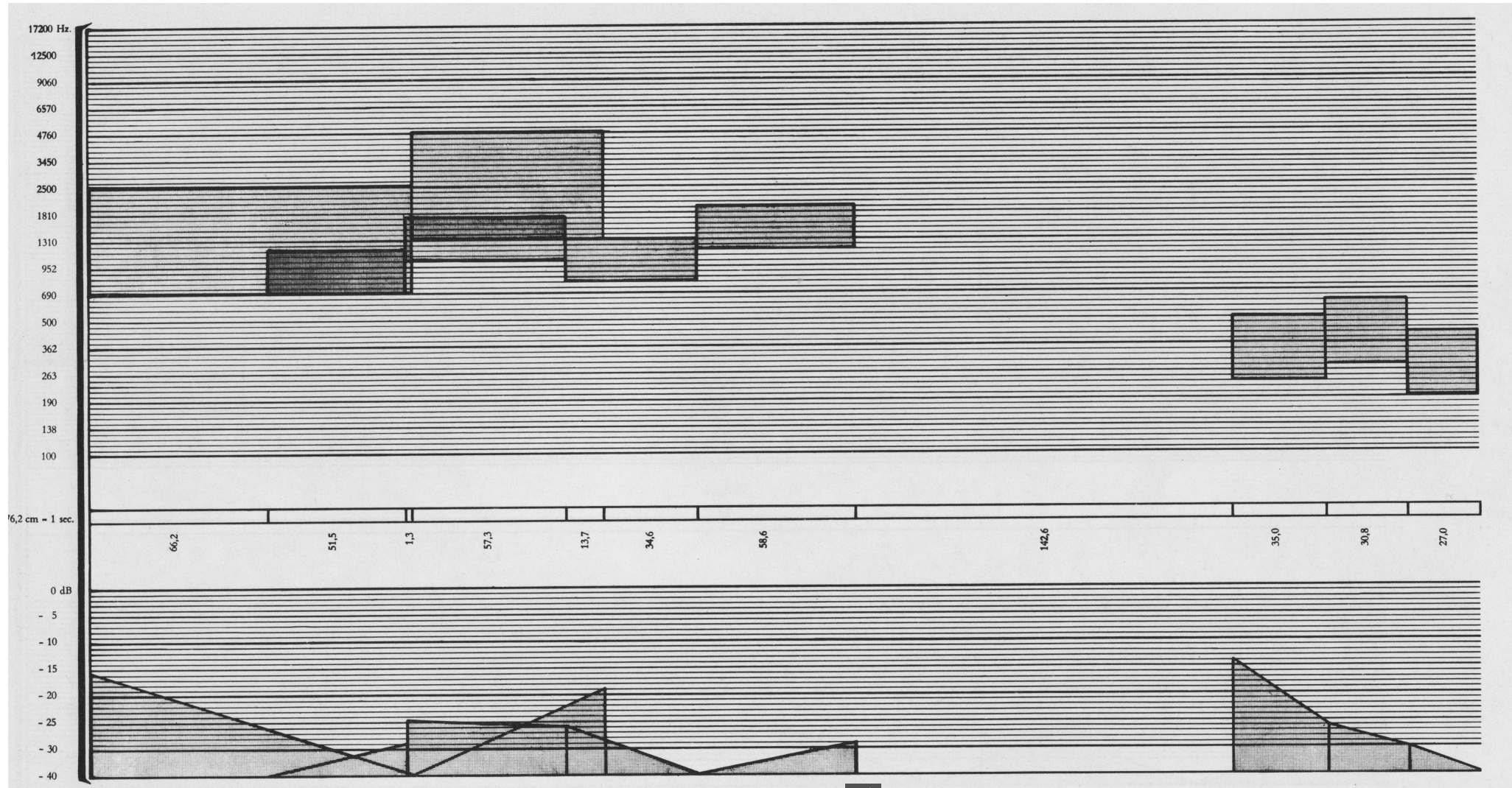
Outline

- About Stockhausen's „Studie II“
- What does Re-Generation of it mean
- Why this Re-Generation
- Show it in practice
- Problems of the Re-Generation
- What can be learned by it
- Future improvements



Stockhausen Studie II Beginning of Score

© Universal Edition Wien



Stockhausen Studie II Beginning of Score



© Universal Edition Wien



What re-generation means

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Eckhart Studie II

Tonhöhen:					Result.	Zeitdauern:					Resultat	Zeitabstände:					Result.	Lautstärke:					Result.
6	Tr.	F.	Br.	K.	Wrt.	Tr.	F.	Br.	D.	cm	Tr.	F.	Br.	D.	cm	Tr.	F.	Br.	L.	db			
2	3	3	5	3	67	1	1	4	1	119,2	4	4	4	4	20,9	5	5	1	5	16			
				5	109				3	71,1				1	45,3			2	19	119,1			
4		5	2	1	136		3	1	4	51,5	1	2	2	2	104,6		2	3	3	29			
				4	139				2	58,6				5	71,1			1	25				
				2	137				5	48,3				3	91,95			4	26				
				5	140				2	58,6				3	91,95			3	29	1217			
5	1	3	2		58		4	2	3	35	2	1	2	2	80,85	3	4	5	14	359,6			

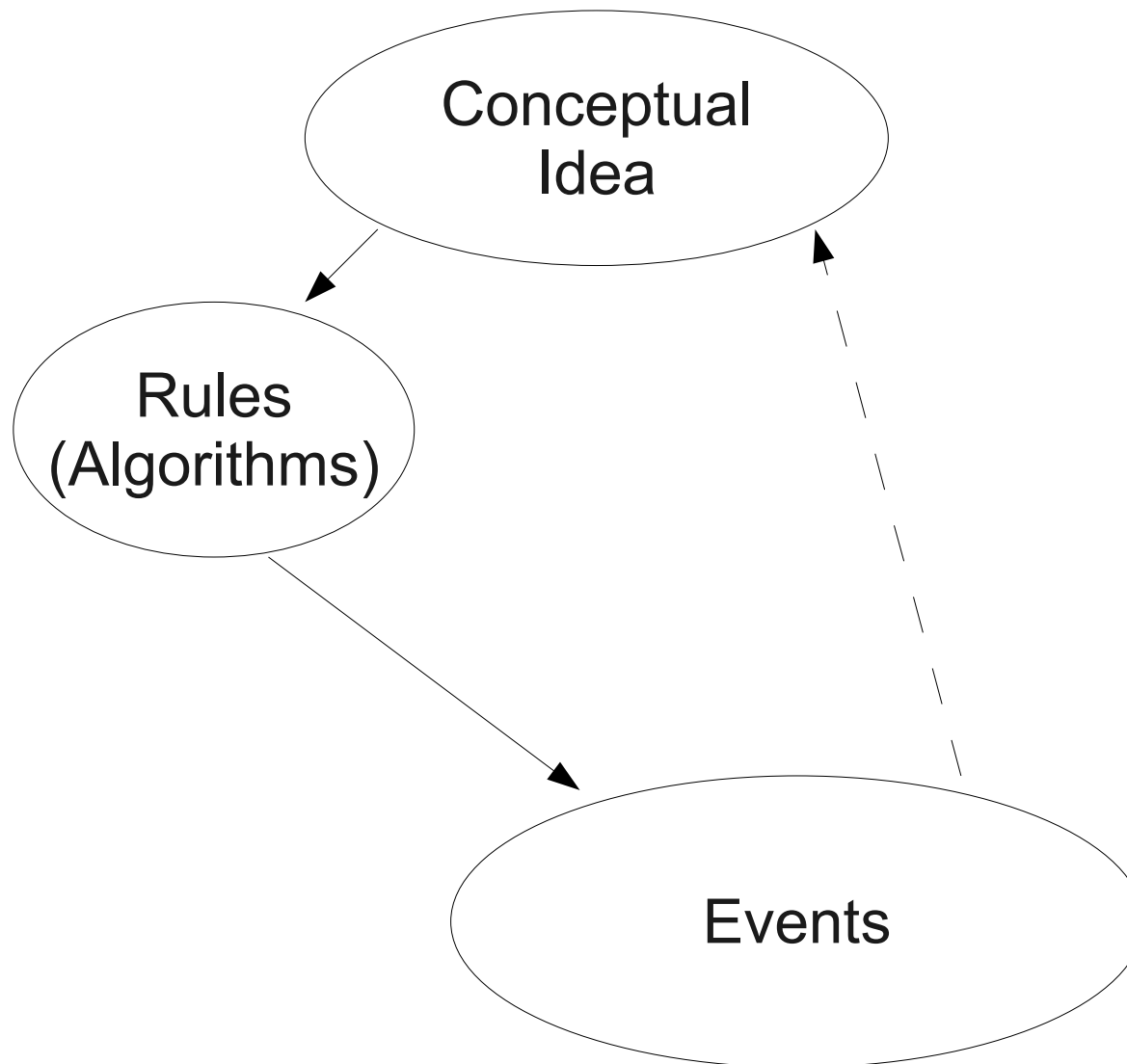
14-2 6 Pausen

Stockhausen working sheet for the beginning of Studie II (top)

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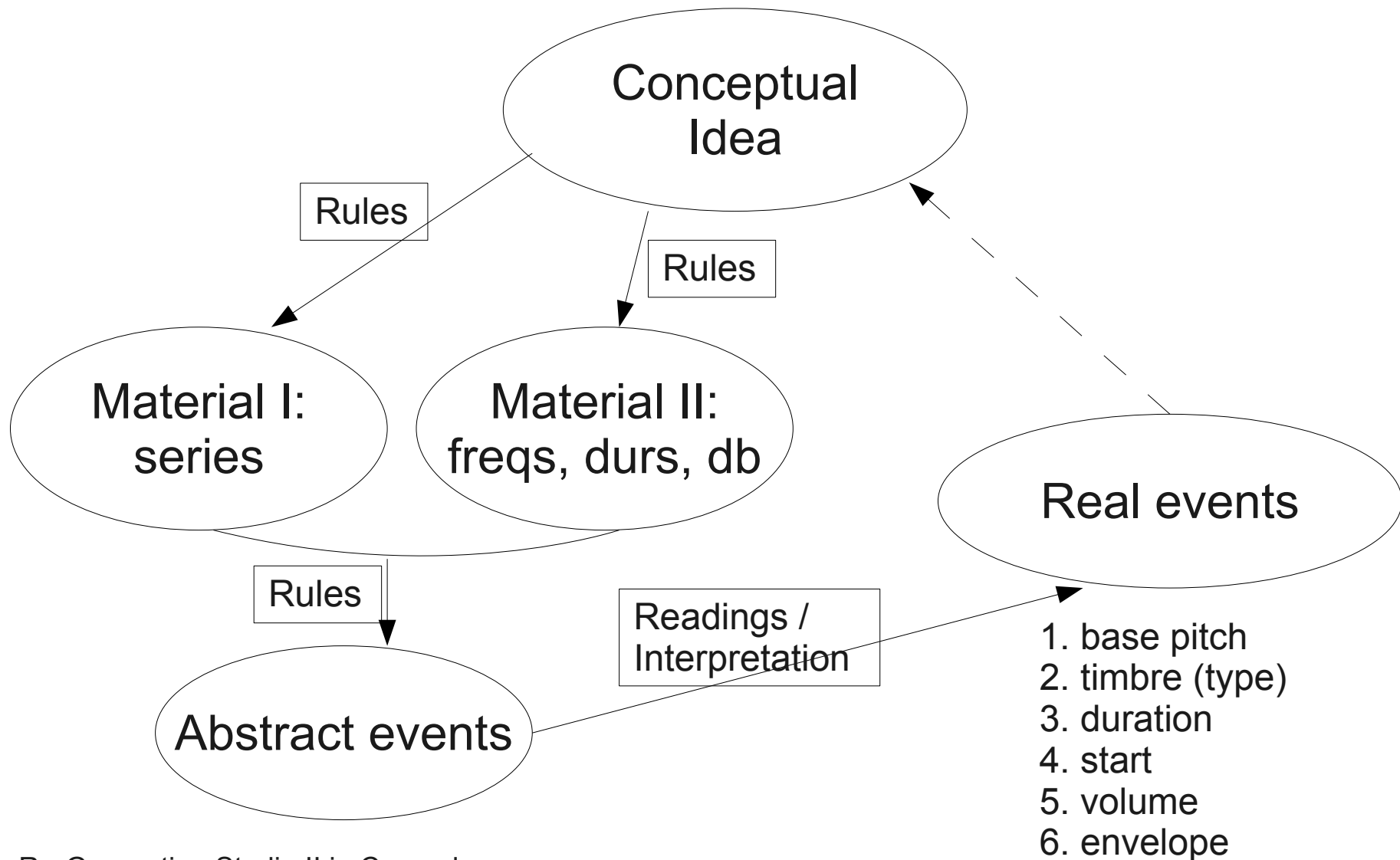


Simplified model for a programmable (*'algorithmic'*) composition





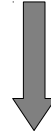
Base model for the (re-) generation of Studie II





Material I: series / number squares

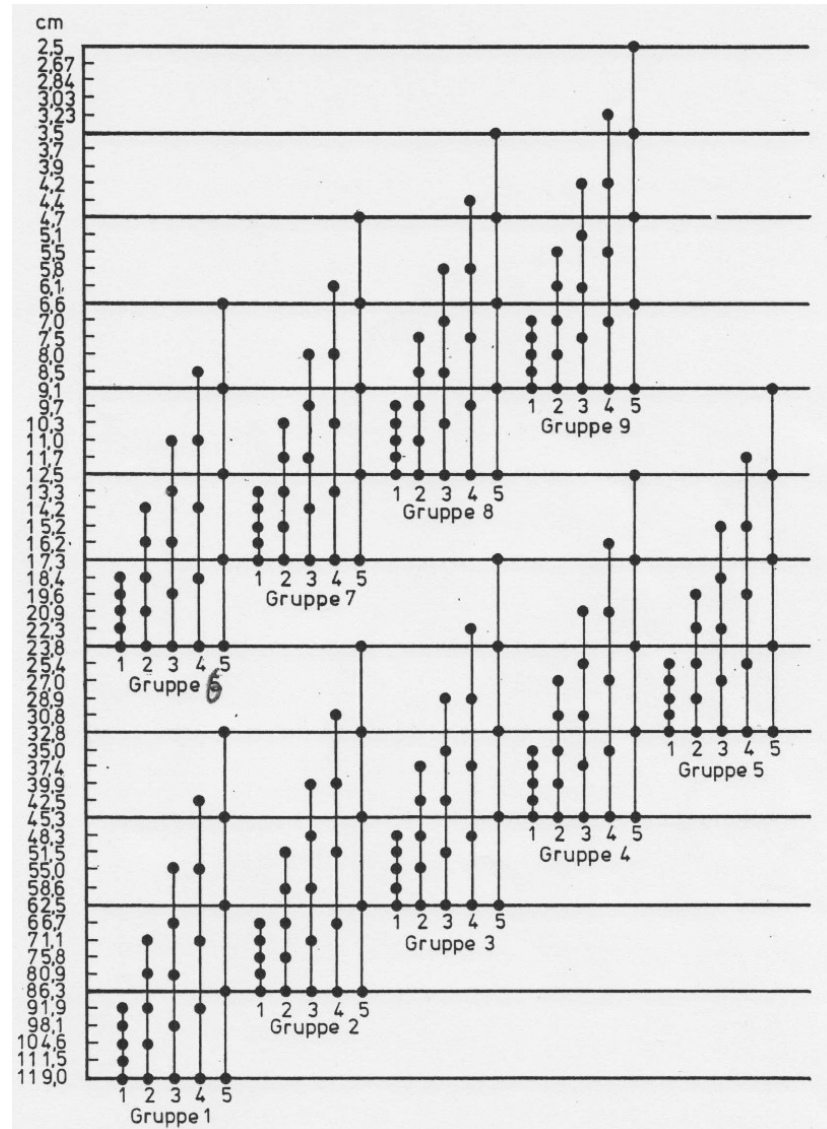
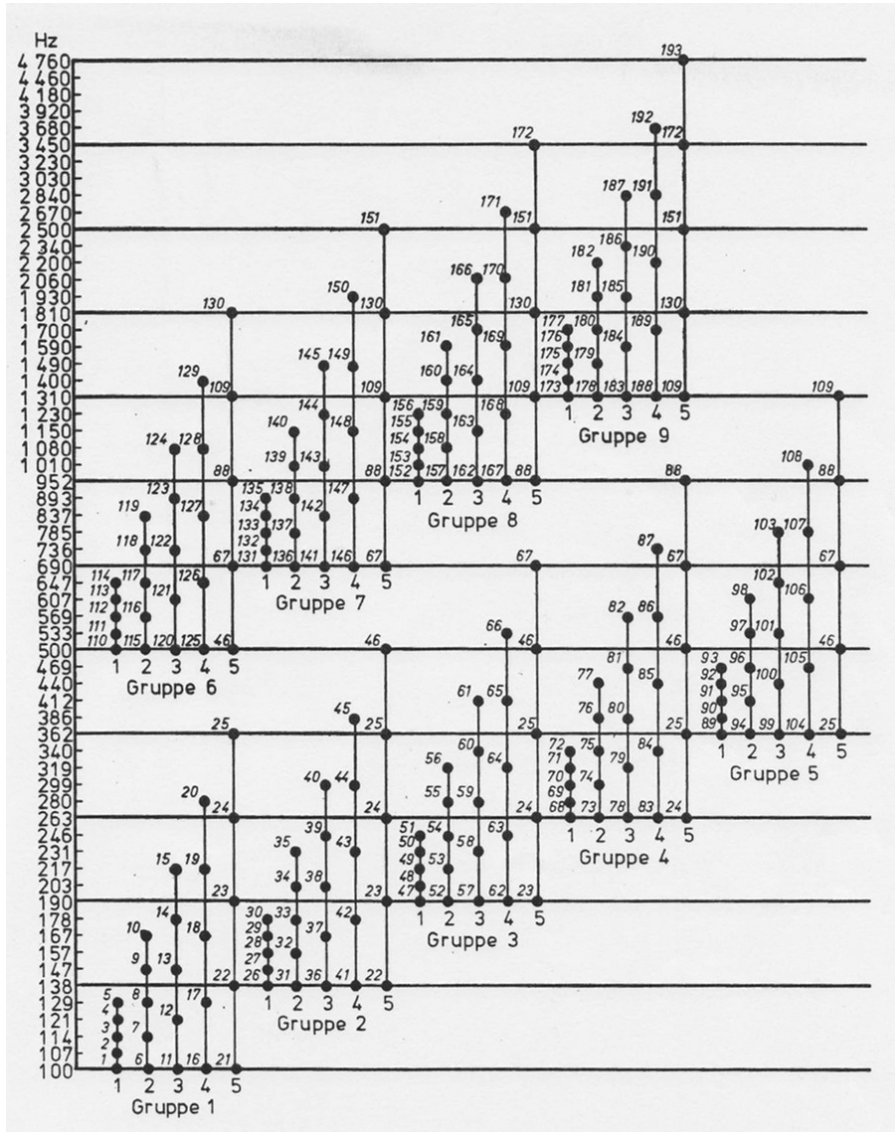
3 5 1 4 2



3 5 1 4 2	5 2 3 1 4	1 3 4 2 5	4 1 2 5 3	2 4 5 3 1
5 2 3 1 4	3 5 2 1 4	2 3 4 5 1	3 2 5 4 1	2 3 1 4 5
1 3 4 2 5	4 3 5 2 1	3 5 4 2 1	5 1 3 4 2	2 3 4 5 1
4 1 2 5 3	2 5 3 4 1	5 2 1 4 3	2 1 5 4 3	2 1 4 3 5
2 4 5 3 1	1 3 5 4 2	4 3 5 2 1	1 4 5 2 3	2 1 5 4 3
3 1 5 2 4	1 4 3 5 2	5 3 2 4 1	2 5 4 1 3	4 2 1 3 5
1 4 3 5 2	3 1 4 5 2	4 3 2 1 5	3 4 1 2 5	4 3 5 2 1
5 3 2 4 1	2 3 1 4 5	3 1 2 4 5	1 5 3 2 4	4 3 2 1 5
2 5 4 1 3	4 1 3 2 5	1 4 5 2 3	4 5 1 2 3	4 5 2 3 1
4 2 1 3 5	5 3 1 2 4	2 3 1 4 5	5 2 1 4 3	4 5 1 2 3



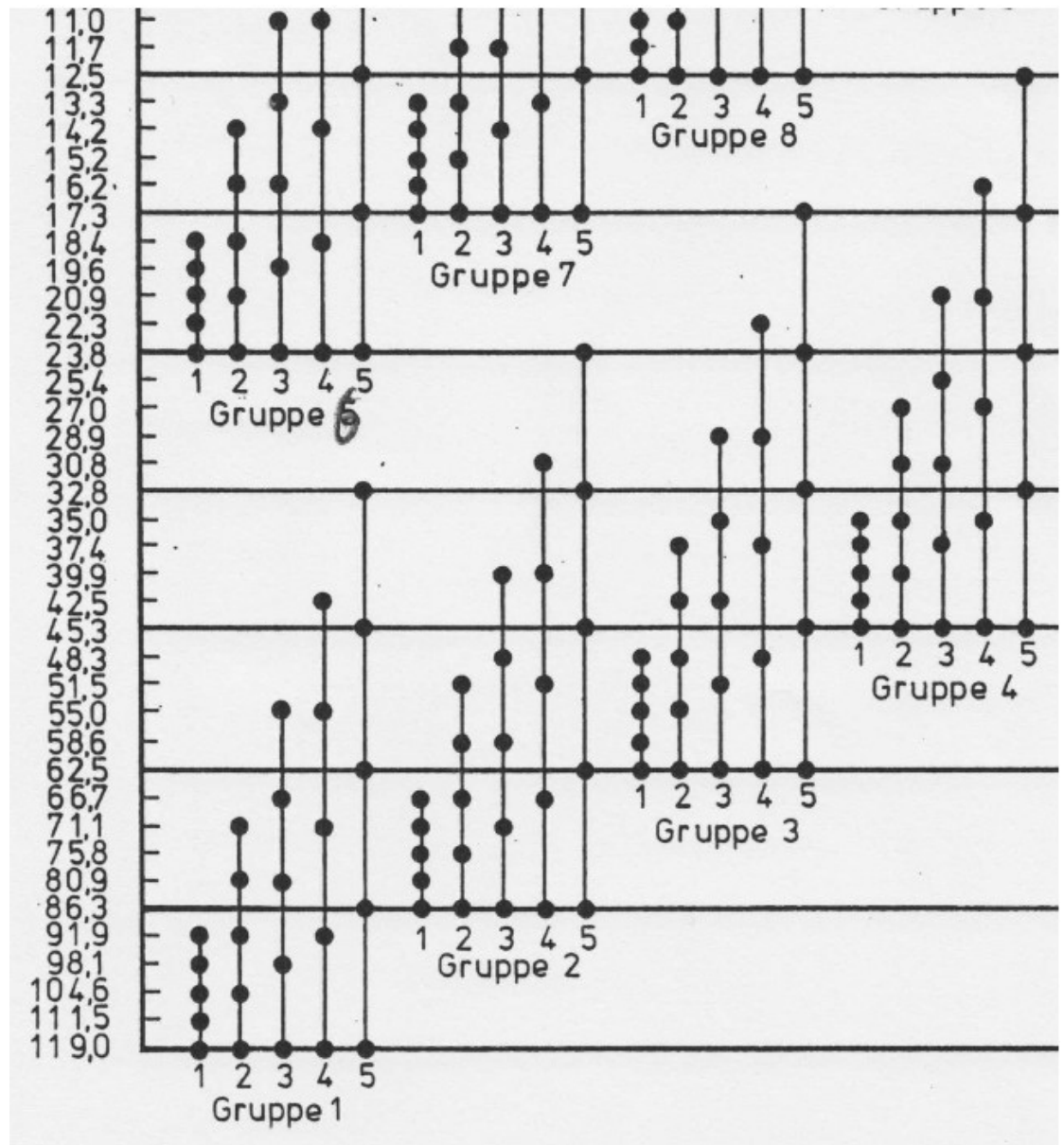
Material II: tables for possible frequencies, durations, intensities

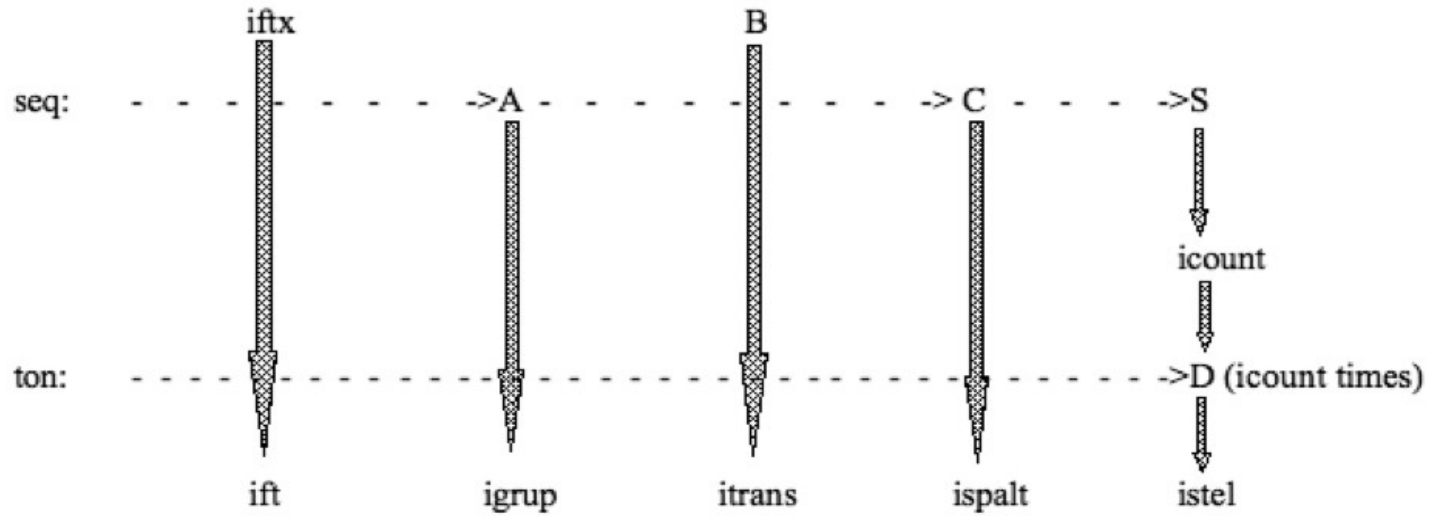




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n:	Result.	Zeitdauern:				Resultat	Zeital		
K.	W.	Tr.	F.	Br.	D.	cm	Tr.	F.	B.
3	67	1	1	4	1	119,2	4	4	
5	109	1			3	71,1	1		
1	136		3	1	4	51,5	1		
4	139				2	58,6			
2	137				5	48,3			
5	140				2	58,6			
2	58		4	2	3	35	2		
3	59				4	30,8			
1	57				5	27,05			
4	60				1	45,3			
1	57				3	35			
3	112		2	5	5	23,8	5		
4	113				4	32,85			
2	111				2	62,5			
5	87		5	3	1	32,85	3		
4	144	✓	2	3	5	89,85	3		
1	141	✓			2	32,8			



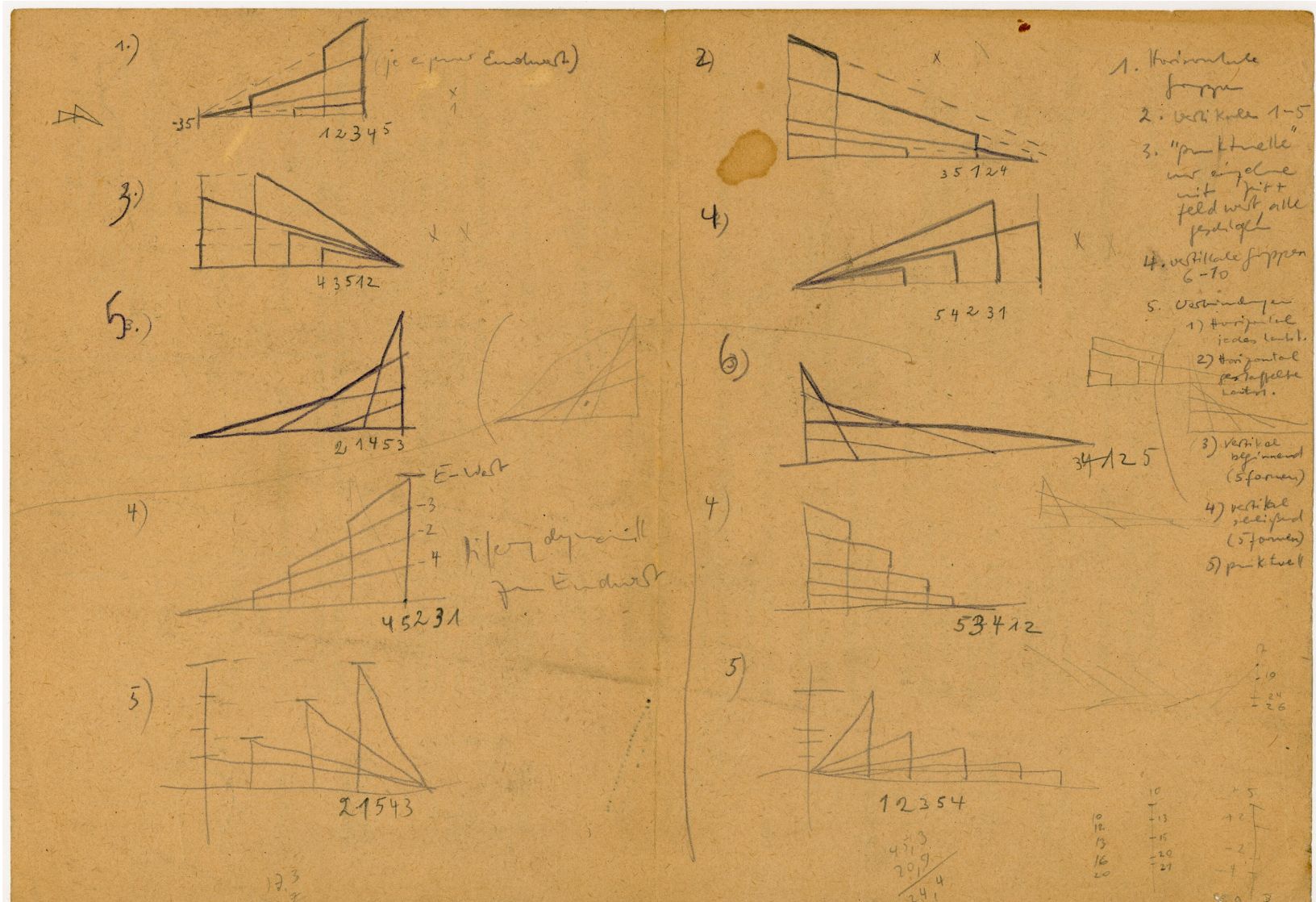


In Csound Code:

```

indxcount      = 0
indxtonabs     = 0
seq:
icount         tab_i      indxcount, iftcount
igrup          tab_i      indxcount, iftgrup
ispalt         tab_i      indxcount, iftspalt
indxton       = 0
ton:
istel         tab_i      indxtonabs, iftstel
ival          SS2_ValsAusGTSS
              tabw_i
indxtonabs     =
              loop_lt     indxton, 1, icount, ton
              loop_lt     indxcount, 1, ftlen(iftcount), seq

```



Stockhausen early sketch for envelopes. © Archiv der Stockhausen Stiftung



Small errors („Versehen“) listed in the work of Heinz Silberhorn (Die Reihentechnik in Stockhausens Studie II, 1980)

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Dauern in Teil I

Seite der Partitur	Struktur	Gruppe	Transpositions- intervall	transponierte Gruppe	Spalte bestimmen	Stelle	Dauer in cm	Zeiteinheit von - bis
1	2	3	4	5	6	7	8	9
1	A	R3:1	1	1	R4:4	R3:1	119,0	1-3
		1	1	1	4	3	71,0	4-5
		3	1	3	1	4	51,5	2
		3	1	3	1	2	58,6	3-4
		3	1	3	1	5	48,3	5-6
		3	1	3	1	2	58,6	7
		4	1	4	2	3	35,0	9
		4	1	4	2	4	30,8	10
		4	1	4	2	5	27,0	11
2		4	1	4	2	1	45,3	1
		4	1	4	2	3	35,0	2
		2	1	2	5	5	32,8	4
		2	1	2	5	4	62,5	5
		2	1	2	5	2	62,1	6-8
		5	1	5	3	1	32,8	7
	B	2	1	2	3	5	39,8	9
		2	1	2	3	2	71,1	10
3		3	1	3	2	1	62,5	1
		3	1	3	2	4	42,5	2
		3	1	3	2	3	48,3	3-4
		4	1	4	5	4	17,2	4-5
		5	1	5	4	3	19,6	7
		5	1	5	4	5	11,7	8
		5	1	5	4	2	25,4	9
		5	1	5	4	1	32,8	10
		1	1	1	1	R4:4	98,1	12
		1	1	1	1	1	119,0	13
4		1	1	1	1	2	111,5	1
		1	1	1	1	5	91,9	2
		1	1	1	1	3	104,6	3

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	1	2	3	4	5	6	7	8	9
C	3	1	3	5	3	32,8	4		
	3	1	3	5	2	45,3	5-7		
	5	1	5	1	5	25,4	6		
	5	1	5	1	4	27,0	7-8		
	5	1	5	1	1	32,8	9		
5	4	1	4	3	5	20,9	2		
	4	1	4	3	1	45,3	3		
	4	1	4	3	3	30,8	4		
	4	1	4	3	4	25,4	5		
	2	1	2	4	2	66,7	7		
	2	1	2	4	2	66,8	8		
	2	1	2	4	1	86,1	9-10		
	2	1	2	4	5	30,8	11-12		
	2	1	2	4	4	32,8	13-15		
	1	1	1	2	3	92,0	131,0	5,5	5,6
D	5	1	5	2	1	32,8	12-13		
	5	1	5	2	4	22,3	14		
6	2	1	2	1	5	66,7	3-4		
	1	1	1	5	2	86,3	4-5		
	1	1	1	5	3	62,5	6-9		
	1	1	1	5	2	86,2	10-12		
	1	1	1	5	5	45,3	13-14		
	4	1	4	4	5	16,2	7		
	4	1	4	4	3	27,0	8		
	4	1	4	4	1	45,3	9-10		
	3	1	3	3	2	51,5	12-13		
	3	1	3	3	3	42,3	14-15		
	3	1	3	3	1	62,6	16		
	3	1	3	3	4	35,0	17		
7	3	1	3	3	5	28,9	1		
E	4	1	4	1	2	42,3	3		
	4	1	4	1	3	39,8	4		
	3	1	3	4	4	28,9	6-8		
	5	1	5	5	5	9,1	7		
	5	1	5	5	1	32,9	8-9		
	5	1	5	5	2	23,8	10		
	5	1	5	5	1	32,8	11		
	5	1	5	5	4	12,5	12		
	2	1	2	2	3	66,7	14		
8	2	1	2	2	5	51,5	1		
	2	1	2	2	2	75,8	2		
	2	1	2	2	1	86,2	3-4		
	1	1	1	3	5	55,0	4-5		
	1	1	1	3	4	66,7	6		
	1	1	1	3	3	80,8	7-11		



-25-	4	2	2	3	1	57	5	1	2	22,3	1	2	3	48,3	4	3	5	4	-17	✓
1.					3	59			4	10,3			5	19,6			1	-13		
					4	60			5	7			1	119			2	-12		
					2	58			3	75,2			4	30,8			5	-10		
	1	2	4	5	5	109	2	3	1	86,3	3	5	2	32,9	5	2	3	21		
	2	3	5	1	2	111	3	4	2	35	4	4	5	4,5	1	3	3	11		
					3	133			3	19,6			2	25,4			2	13		
	5	3	4	4	4	128	1	2	1	119	2	1	3	39,9	4	1	5	21		
					5	150			4	30,8			1	86,3			4	22		
					1	62			5	19,6			4	27			1	25		
					3	106			2	75,8			1	86,3			2	25		
					2	84			3	48,3			3	39,9			3	25		
																		293,5	279,4	
	3	1	2	4	76	4	5	4	6,6	5	3	4	7	2	4	3	16			
					2	32			5	3,5			2	19,6			4	13		
					1	6			1	45,3			5	5,7			2	9		
																		32,3		
	3	2	5	5	130	3	2	2	39,3	2	3	4	18,4	5	3	2	23			
					2	24			1	62,5			1	86,3			1	15		
					7	32			4	16,1			2	51,5			5	3		
																		117,9	156,2	
	2	3	2	4	76	5	3	3	11,7	3	4	5	6,2	2	5	4	20			
					3	75			5	4,2			3	79,6			3	25		
																		159		
	5	1	3	4	81	2	4	2	48,3	4	1	2	30,8	3	2	1	5			
					3	59			1	86,3			4	14,2			4	24		
					5	103			5	8,5			5	9,6			5	17		
					2	37			4	15,2			3	20,9			2	12		
					1	11			3	27,1			1	45,3			3	19		
																		185,4	120,8	
	4	4	1	4	92	1	5	3	32,9	5	2	5	10,4	1	7	2	+1			
					1	89			5	9			2	20,9			4	13		
					2	90			1	119			3	13,3			5	19		
					5	93			4	17,3			1	32,4			3	7		
																		178,2	77	
	1	5	4	3	148	4	1	2	30,8	1	5	4	17,3	4	4	1	10			
					2	70			3	5,8			3	27,4			1	4		
					2	48			2	27,1			5	13,3			3	7		
					5	114			3	16,2			2	42,5			1	8		
					4	92			1	45,3			1	62,5			4	12		
					1	26			4	9,7			4	19,6			5	10		
																		104,1	165,3	
	12	1	3	3	5	82	3	5	1	45,3	5	5	4	4,7	3	3	2	43		
					4	83			4	10,3			4	3			4	5		
					3	727			4	5,7			5	5,7			4	10		
					4	149			2	79,6			2	27,1			5	5		
																		35,6	47	

Stockhausen working sheet for part five of Studie II
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Handwritten working sheet for part three of Studie II by Stockhausen. The sheet is on a grid and contains numerical data organized in columns. It includes various annotations in red and blue ink, such as "3 Trampo", "wed. wie Tsch.", and "Dynamik". There are also some handwritten notes on the right margin like "11/10/9" and "21/10/9". The page is numbered "22-" on the right side.

Stockhausen working sheet for part three of Studie II
© Archiv der Stockhausen-Stiftung für Musik, Kürten



Three ways of working in Studie II

Applying the base
rules (part 1)

Tonhöhen:					Result.	Zeitdauer		
G	Tr.	F.	Br.	K.	Mr.	Tr.	F.	Br.
2	3	3	5	3	67	1	1	4
				5	109			
4		5	2	1	136		3	1
				4	139			
				2	137			
				5	140			
5		1	3	2	58		4	2
				3	59			
				1	57			
				4	60			
				1	57			
3		4	1	3	112		2	5
				4	113			
				3	111			
1		2	4	5	87		5	3
2		5	3	4	144		2	3

Re-Generating Studie II in Csound

Changing some rules, but
they remain rules (part 3)

1	2	1	1	110	M	3	3
5	1	4	5	108		2	2
			2	42			
			3	64			
			1	16			
			4	86			
2	3	1	3	91		5	4
			5	135			
3	4	2	2	95		4	5
			1	73			
			4	139			
1	2	5	4	88		1	3
4	5	3	3	143			
			5	187			
			2	121			
			7	99			
3	2	3	2	58		2	5
			5	124			
			3	80			
5	3	2	4	118			

Breaking the program-
mability by spontaneous
decisions (part 5)

17							
13							
12							
10							
21							
11							
13							
21							
22							
25							
21	24						
25	23						
16							
13							
9							
23							
15							
3							
20							
25							
5							

Links

QuteCsound:

<http://sourceforge.net/projects/qutecsound>

(Re-Generation: Examples → Music)

Version without widgets (english and german):

www.joachimheintz.de

(→ Software)